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consulting engineers

51 – 52 Tottenham Court Road
London W1T 2EH

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12336-87

Revision: F1

December 2017

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Structural ◆ Civil ◆ Environmental ◆ Geotechnical ◆ Transportation

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1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 51 – 52 Tottenham Court Road, London W1T 2EH (planning reference 2016/2027/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. A revised BIA has been prepared by Sinclair Johnston & Partners (SJP) Limited and the checker has CEng MICE MIstrcutE qualification. It has been demonstrated that the BIA has been reviewed and approved by a Chartered Geologist (CGeol) in respect groundwater and land stability issues.

1.5. A number of revisions of BIA documents have been received to address the queries of the initial BIA Audits by CampbellReith.

1.6. The proposal is to lower the existing basement, extend the buildings' footprint horizontally to the rear and vertically by an additional storey to both Nos. 51 and 52 Tottenham Court Road.

1.7. It is indicated in the proposed structural drawings and reports that the preferred construction method for the basement works would be to underpin the existing Party Walls and create a new, reinforced concrete basement box for the proposed subterranean structure founded on piles. In the revised documents, the structural methodology, ground movement assessment and structural monitoring strategy have been updated. The feasibility of the underpinning has been demonstrated, propped by 'underpinned' ground beams founded upon piles, with existing foundations supported by a Pynford beam tied to the ground beams / piles.

1.8. Ground conditions at No.52 are identified as 6m of Made Ground overlying 2.5m of River Terrace Deposits over London Clay. A groundwater seepage was encountered within the Made Ground and standing water level monitored within the River Terrace Deposits. Further investigation across the remaining site footprint will be required in advance of construction.

1.9. Insufficient site investigation and geotechnical assessment is presented. Outline pile capacities are not based on site specific information. On-site investigation data indicates the Made Ground to be loose.

1.10. The Ground Movement Assessment (GMA) has been revised and indicates damage to the neighbouring properties will be a maximum of Category 1 (Very Slight) on the Burland Scale. Based on the November 2017 documents, the feasibility of the scheme has been demonstrated, and will be reliant upon good workmanship and close control in conjunction with a robust structural monitoring scheme.

1.11. The revised BIA confirms that the proposed piled raft slab is to be below the groundwater level and resin grouting is proposed to control groundwater to stabilise soils during construction. A Basement Construction Plan (BCP) will be required to demonstrate that resin grouting will be appropriately controlled to avoid additional stability and hydrogeological impacts.

1.12. It is anticipated that the proposed development will not impact on the wider hydrological and hydrogeological environments, although the effects of any resin grouting should be confirmed within a BCP.

1.13. Structural monitoring and condition surveys are proposed. Whilst there are inconsistencies between the BIA documents, the SJP documents are considered to supersede the documents provided by GEA. Trigger values are considered suitable to ensure a maximum damage of Category 1 to neighbours.

1.14. The BIA identifies that a detailed unexploded ordnance (UXO) desktop threat assessment will be required in advance of construction.

1.15. The proposed development must be constructed with regard to London Underground assets in the vicinity of the site, in consultation with the relevant TFL asset protection engineer.

1.16. It is accepted that there are no slope stability issues and that the development is at low risk of flooding.

1.17. Queries are discussed in section 4 and summarised in Appendix 2. The revised BIA does meet the relevant LBC's policy criteria, subject to a BCP to confirm: the ground conditions through additional investigation; the grouting methodology and design; sufficient structural monitoring.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) in July 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 51 – 52 Tottenham Court Road, London W1T 2EH (planning reference 2016/2027/P).

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water
- The Local Plan (A5 Basements) 2017.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment

c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as "*Demolition of existing rear extensions and erection of a 4 storey rear extension, basement extension, roof extensions comprising an additional storey with mansard level above to no. 51 and set back roof extension no. 52 and external alterations including new shopfronts all to provide a mixed use retail, office and residential development involving the refurbishment and amalgamation of the existing ground floor retail units, refurbishment/reconfiguration of existing uses on the upper floors*

including the provision of additional office space at first – third floor levels and a new 3 bed residential flat at fourth floor level".

Neither building is listed, although they are both designated as "positive contributors" to the Charlotte Street Conservation Area Appraisal and Management Plan (2008). The nearest listed building to the site is the Rising Sun Public House at 46 Tottenham Court Road.

2.6. CampbellReith accessed LBC's Planning Portal on 27.07.16 and gained access to the following relevant documents for audit purposes:

- LBC Application for Planning Permission dated 08/04/2016
- LBC Basement Impact Assessment Audit Instruction
- Basement Impact Assessment (BIA) report (Ellis and Moore Consulting Engineers Ltd, report ref: 15606 – c20160712bia, report issues 1 & 2, February and July 2016)
- Site Investigation (SI) report (Ground Engineering Ltd, report ref: C13604, January 2016)
- Construction Management Plan (M.E.F. Construction Services Ltd, report status: Initial Draft, January 2016)
- Construction Traffic Management and Access Plan (M.E.F. Construction Services Ltd, report status: Initial draft, January 2016)
- Environmental Impact Assessment and Control (M.E.F. Construction Services Ltd, rev: 00, January 2016)
- Planning statement for 51–52 Tottenham Court Road (Savills, April 2016)
- Planning Application Drawings consisting of
- Location Plan – (Squire & Partners drawing 13081-G100_P_00_001, rev: -)

  Existing Plans –

  Basement (Squire & Partners drawing 13081-JA12_P_B1_001, rev: -)

  Ground floor (Squire & Partners drawing 13081-JA12_P_00_001, rev: -)

  1st floor (Squire & Partners drawing 13081-JA12_P_01_001, rev: -)

  2nd floor (Squire & Partners drawing 13081-JA12_P_02_001, rev: -)

  3rd floor (Squire & Partners drawing 13081-JA12_P_03_001, rev: -)

  Roof (Squire & Partners drawing 13081-JA12_P_RF_001, rev: -)

  Front Elevation (Squire & Partners drawing 13081-JA12_E_NE_001, rev: -)

  Rear Elevation (Squire & Partners drawing 13081-JA12_E_SW_001, rev: -)

  North West Elevation (Squire & Partners drawing 13081-JA12_E_NW_001, rev: -)

South East Elevation (Squire & Partners drawing 13081-JA12_E_SE_001, rev: -)

Section A-A (Squire & Partners drawing 13081-JA12_S_AA_001, rev: -)

Demolition Plans –

Basement (Squire & Partners drawing 13081-C645_P_B1_001, rev: -)

Ground floor (Squire & Partners drawing 13081-C645_P_00_002, rev: -)

1st floor (Squire & Partners drawing 13081-C645_P_01_002, rev: -)

2nd floor (Squire & Partners drawing 13081-C645_P_02_002, rev: -)

3rd floor (Squire & Partners drawing 13081-C645_P_03_002, rev: -)

Roof (Squire & Partners drawing 13081-C645_P_RF_001, rev: -)

Front Elevation (Squire & Partners drawing 13081-C645_E_NE_004, rev: -)

Rear Elevation (Squire & Partners drawing 13081-C645_E_SW_002, rev: -)

North West Elevation (Squire & Partners drawing 13081-C645_E_NW_002,rev: -)

South East Elevation (Squire & Partners drawing 13081-C645_E_SE_002, rev: -)

Proposed Plans –

Basement (Squire & Partners drawing 13081-C645_P_B1_001, rev: B)

Ground floor (Squire & Partners drawing 13081-C645_P_00_001, rev: C)

1st floor (Squire & Partners drawing 13081-C645_P_01_001, rev: D)

2nd floor (Squire & Partners drawing 13081-C645_P_02_001, rev: D)

3rd floor (Squire & Partners drawing 13081-C645_P_03_001, rev: D)

4th floor (Squire & Partners drawing 13081-C645_P_04_001, rev: D)

Roof (Squire & Partners drawing 13081-C645_P_RF_001, rev: B)

Front Elevation (Squire & Partners drawing 13081-C645_E_NE_001, rev: D)

Rear Elevation (Squire & Partners drawing 13081-C645_E_SW_001, rev: -)

North West Elevation (Squire & Partners drawing 13081-C645_E_NW_001,rev: -)

South East Elevation (Squire & Partners drawing 13081-C645_E_SE_001, rev: -)

Section AA (Squire & Partners drawing 13081-C645_S_AA_001, rev: B)

Area and accommodation schedules –

Existing and proposed schedule of areas

Existing use mix drawing (Squire & Partners drawing 13081-F0_P_AL_001,rev:B)

Proposed use mix drawing (Squire&Partners drawing 13081-F0_P_AL_005,rev:C)

- Design and Access Statement (Squire & Partners Ltd, report status: Planning Issue, March 2016)
- Heritage Assessment (Peter Stewart Consultancy, April 2016)
- Environmental Noise Survey and Plant Noise Criteria (Applied Acoustic Design, report ref: 15204/001/twt, May 2016)
- Energy & Sustainability Statement (Mecserve Sustainability, report ref: C6092; report status: Final report for planning, November 2015)
- Air Quality Assessment for the proposed development at 51–52 Tottenham Court Road, London (Aether Ltd, report ref: AQ_assessment/2016/51_Tottenham_Court_Rd; report status: Final, January 2016)
- Daylight and Sunlight Study (Right of Light Consulting, April 2016)
- Crossrail response to "2016/2027/P 51 Tottenham Court Road, London W1T 2EH" 18.05.16 email
- 02.06.16 planning Comment by Richenda Walford for BCAAC

2.7. Additional information was provided with regards to further information requested in October 2017, comprising:

- Revised BIA – Structural Engineer's report and construction method statement for subterranean development at 51-52 Tottenham Court Road, London, W1T 2EH – dated March 2017 by Sinclair Johnston and Partners Limited – incorporating London Underground Ltd, Lost Rivers of London Record and Unexploded Ordnance (UXO) information as well as structural drawings and Ground Movement Assessment report.
- Architectural Addendum for 51-52 Tottenham Court Road, London–dated April 2017 by Squire and Partners
- Statement of case for 51-52 Tottenham Court Road, London – dated April 2017 by Savills.

2.8. Additional information was provided with regards to further information requested in November 2017, comprising:

- Revised BIA – Structural Engineer's report and construction method statement for subterranean development at 51-52 Tottenham Court Road, London, W1T 2EH – dated November 2017 (ref 8781 R 171011 GS) by Sinclair Johnston and Partners Limited.

- Letter to CampbellReith from Sinclair Johnston and Partners Limited dated 14th November 2017 with responses to D2 Audit queries, including additional outline retaining wall calculations, resin grout data sheet and outline structural monitoring strategy.

2.9. Additional information was provided in November and December 2017, comprising:

- Indicative Propping Arrangement by Sinclair Johnston and Partners Limited.
- Indicative Construction Sequence by Sinclair Johnston and Partners Limited.
- Email to CampbellReith from Sinclair Johnston and Partners Limited dated 1st December 2017.
- Letter to CampbellReith from Sinclair Johnston and Partners Limited dated 23rd November 2017.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The revised BIA has been prepared by Sinclair Johnston & Partners Limited and the checker has CEng MICE MIStructE qualification. The ground movement assessment report (appended in Appendix H of the revised BIA) has been checked by a Chartered Geologist (CGeol).
Is data required by Cl.233 of the GSD presented?	No	Outline works programme not included.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Lost Rivers of London Record information included in revised BIA.
Are suitable plan/maps included?	Yes	Refer to Ground Engineering Site Investigation Report.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Refer to Squire and Partners drawings and Design and Access Statement.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer to Ellis + Moore BIA report; section 2.0.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer to Ellis + Moore BIA report; section 2.0.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer to Ellis + Moore BIA report; section 2.0.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	Refer to Ground Engineering Site Investigation Report.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Ellis + Moore BIA report; section 3.0.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Ellis + Moore BIA report; section 3.0. Evidence has been provided to prove that the site will not be affected by the Lost Rivers of London.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Ellis + Moore BIA report; section 3.0.
Is factual ground investigation data provided?	Yes	Refer to Ground Engineering Site Investigation Report. However, insufficient for proposed depth of piled foundations.
Is monitoring data presented?	Yes	Refer to Ground Engineering Site Investigation Report.
Is the ground investigation informed by a desk study?	Yes	Unexploded Ordnance (UXO) information provided in revised BIA (Appendix F). Stage 2 desktop study and risk assessment required.
Has a site walkover been undertaken?	Yes	Updated in revised BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	No	GMA assumptions on neighbouring properties' foundations to be confirmed. Assumptions conservative for stability assessment.
Is a geotechnical interpretation presented?	Yes	Refer to Ground Engineering Site Investigation Report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Refer to Ground Engineering Site Investigation Report.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	
Are the baseline conditions described, based on the GSD?	Yes	Refer to Ellis + Moore BIA report.
Do the base line conditions consider adjacent or nearby basements?	Yes	Refer to Ground Engineering Site Investigation Report.
Is an Impact Assessment provided?	Yes	Updated in revised BIA.
Are estimates of ground movement and structural impact presented?	Yes	Updated in revised BIA.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Updated in revised BIA.
Has the need for monitoring during construction been considered?	Yes	Structural monitoring proposed in SJP is considered to supersede the GEA reports.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Updated in revised BIA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Updated in revised BIA. Proposals feasible. Ground conditions should be confirmed through further SI.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Refer to Ellis + Moore BIA report.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated in revised BIA. Proposals feasible. Ground conditions should be confirmed through further SI. Effects of grouting to be confirmed.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Updated in revised BIA. Robust structural monitoring should be implemented to ensure stability within Category 1.
Are non-technical summaries provided?	No	None in revised BIA.

4.0 DISCUSSION

4.1. The initial Basement Impact Assessment (BIA) was carried out in 2016 by Ellis + Moore consulting engineers with a separate site investigation report by Ground Engineering Limited (GE).

4.2. Revised BIA documents have been received in September, November and December 2017 to address the queries of the initial BIA Audits performed by CampbellReith. The revisions include a BIA prepared by Sinclair Johnston & Partners Limited and a Ground Movement Assessment (GMA) by Geotechnical and Environmental Associates (GEA). The checker to the revised BIA has CEng MICE MIStructE qualifications. The GMA (and subsequent revision) has been checked by a Chartered Geologist (CGeol).

4.3. The site is located within the Charlotte Street conservation area, is rectangular in shape and set over circa 230m^2 in plan area. No. 51 & 52 Tottenham Court Road are three-storey and four-storey high buildings, respectively, with basements. The LBC Instruction to proceed with the audit identified that the basement proposal did not involve, or was not in close proximity to, a listed building.

4.4. The proposed basement consists of a single storey construction formed by lowering the existing basement at the front of the development site by approximately 1.10 metres and excavating the rear of portion of the site to the same level by approximately 3.50 metres. The building's existing footprint will be extended horizontally, to the rear, and vertically by 1No. additional storey on both No.51 and No.52. An existing party/dividing wall between 51-52 Tottenham Road will be demolished.

4.5. Structural drawings submitted show proposals for a new, in-situ reinforced concrete piled raft slab and retaining walls to form the substructure. The proposed pile lengths are inconsistently presented but are indicated to extend up to 25m below ground level (bgl). Underpinning of existing foundations is proposed, to bear within the Lynch Hill Gravel, >6m bgl.

4.6. The site investigation undertaken in 2016 indicates that the proposed basement will be underlain by Made Ground. A window sample borehole with dynamic probing was carried out at the rear of the site. The borehole information confirmed the presence of Made Ground to 6.0m bgl, Lynch Hill Gravel to 8.3m bgl, with London Clay indicated to 10m bgl. Given that the proposed piles may extend to 25m bgl, further SI to confirm design parameters will be required. The Made Ground is noted to be loose, with 3no SPT tests indicating N = 4, and 1no result of N = 10. It is also noted that Made Ground can vary in thickness over short lateral distances, and further SI should be undertaken to confirm the depth of Made Ground across the site where underpinning is proposed. Further site investigation should be subject to a Basement Construction Plan (BCP).

4.7. Groundwater was encountered at 4.8m as a seepage during the SI, with a standing water level monitored at approximately 6.0m bgl. Whilst the proposed basement slab will be at 4.0m bgl, the underpinning of existing foundations is proposed to be founded within the Lynch Hill Gravel, below groundwater level. Consideration has been given to the prospect of the proposed underpinned walls creating an obstacle to groundwater flow, although this is unlikely assuming penetration of <0.5m. However, to control groundwater and stabilise soils during construction, resin grouting is proposed. It is recommended that grouting works are subject to a BCP to ensure they are properly designed and controlled on site, to avoid further impacts to stability and subterranean groundwater flow. Notwithstanding this, hydrogeological impacts are not anticipated, given that flow should continue below the basement.

4.8. Construction sequence, temporary and permanent works drawings have been prepared by Sinclair Johnston & Partners Limited. Outline retaining wall calculations have been presented in the November 2017 submission. Underpinning is proposed to be undertaken in two stages. However, it is noted in the most recent submissions that the second stage of underpinning will be undertaken immediately after the first stage has been constructed, and that the first stage will not be supporting the existing foundations until the second stage has been completed. The revised construction sequence indicates that retaining walls will be stiffly propped in both the temporary and permanent state, and that existing foundations will be supported by 'underpinned' ground beams supported on piles, with existing foundations supported by a Pynford Beam tied to the ground beams / piles.

4.9. In support of the revised BIA report (September 2017), estimates of the likely ground movement in the short and long-term due to the proposed basement have been submitted. However, these were based on assumptions that were inconsistent with scale of the proposed works and actual methodology to be adopted. The Ground Movement Assessment (GMA) assumed underpins to a depth of 4m bgl, whereas the BIA indicated they will be to >6m bgl, constructed over 2 stages. The GMA also assumed high stiffness walls in both the temporary and permanent case, whereas the construction sequence indicated the walls are likely to be cantilevers and therefore of low stiffness. The GMA assumed retaining walls will be formed within stiff clay rather than the Made Ground and water bearing granular deposits that will be actually encountered.

4.10. In the November and December 2017 submissions, the construction proposals have been clarified and the GMA has been updated and is stated to reflect the actual construction proposals ie underpinning to >6m bgl; stiffly propped walls. The movements predicted by the GMA are broadly accepted based on the clarified construction sequence, assuming a high level of workmanship.

4.11. The GMA originally predicted Category 2 (Slight) damage to neighbours that could be mitigated to Category 1 (Very Slight) damage by close control of construction. The revised GMA predicts a maximum of Category 1 (Very Slight) damage to neighbours.

4.12. Foundation depths of adjacent structures has been assumed within the GMA. Although it is accepted that assuming a shallow foundation depth is reasonably conservative when assessing building damage impacts, foundations to neighbouring buildings should be confirmed during further site investigation to confirm the magnitude of the impacts.

4.13. In addition to considering impact to adjacent buildings, the GMA should consider impacts to underground structures, if applicable. The presence of a sewer is noted in the BIA, which may require further consideration. Proximity and effects on London Underground Assets should also be confirmed. It is noted that the proposed works should be clear of LUL's exclusion zone. Any potential impact relating from construction should be assessed and discussed with the TFL asset protection engineer.

4.14. Proposals for a movement monitoring strategy were provided in 2016 as part of the Ellis + Moore submission. In the November 2017 submissions structural monitoring strategies are presented by both SJM and GEA, which are inconsistent in some respects. Within the SJM proposal, which is considered to supersede the GEA report, trigger values appear reasonable to control damage impacts to neighbours within Category 1, noting that:

- the frequency of monitoring should be reviewed by the engineer / contractor, and should be increased or decreased to match the programme of works;
- the proposed monitoring reference locations are likely to be within the zone of influence of the works (ie prone to movement themselves) and stable reference points remote from the works should be established;
- the monitoring point locations are insufficient to observe the movements predicted, and any final strategy should include for monitoring to relevant structural walls within the zone of influence (e.g. further along front and rear facades of Nos 49 and 53, along party walls etc).

4.15. The revised BIA submissions of November and December 2017 note that a final movement monitoring strategy will be adopted to reflect the issues noted in 4.14. It is recommended this is subject to a BCP.

4.16. Evidence is presented that demonstrates that the site is at high risk from unexploded ordnance from WWII. Possible post-war development of the site may have encountered and removed UXO, however the risk of deep buried UXO remains significant. As recommend by Dynasafe

BACTEC, a stage 2 detailed desktop study and risk assessment is required and should be undertaken for this site.

4.17. It is understood that the below ground drainage design will be developed should planning consent be granted. As per Ellis + Moore BIA report, it is expected that the proposals will not increase the extent of the existing impermeable hard-standing. It is accepted that the total amount of water entering into the sewer system as a result of the development will not increase.

4.18. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

4.19. It is accepted that the development will not impact on the wider hydrogeology of the area, subject to assessment of the effects of resin grouting to be presented in a BCP, and is not in an area subject to flooding.

4.20. No significant trees have been reported within 15m of the site boundary.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by Sinclair Johnston & Partners Limited and the checker has CEng MICE MIstructE qualification. The GMA has been checked by a Chartered Geologist (CGeol).

5.2. The proposal is to lower the existing basement and extend the basement to the rear.

5.3. The ground conditions at one location are indicated to be loose Made Ground to 6m bgl overlying Lynch Hill Gravel and London Clay. Further SI will be required to demonstrate conditions across the site and to provide site specific design parameters for piles and underpinning, and should be subject to a BCP.

5.4. It is proposed to underpin exiting foundations into the Lynch Hill Gravel and form a piled foundation to support the basement slab at approximately 4m bgl.

5.5. It is proposed to use resin grouting to control groundwater and stabilise soils during construction. It is recommended that these works are subject to a BCP.

5.6. It is accepted that the proposed development should not impact the wider hydrological and hydrogeological environments, subject to the appropriate implementation of resin grouting as controlled via BCP.

5.7. The BIA has demonstrated the feasibility of the proposed scheme, utilising complex temporary works supported on piles, whilst maintaining damage to neighbouring properties within Category 1 (Very Slight). A high level of workmanship will be required.

5.8. Structural monitoring is proposed to control construction and should be subject to a BCP to ensure damage to neighbouring properties is within Category 1 (Very Slight).

5.9. The proposed development must be constructed with regard to London Underground assets in the vicinity of the site, in consultation with the relevant TFL asset protection engineer.

5.10. It is accepted that there are no slope stability issues and that the development is at low risk of flooding.

5.11. Queries are discussed in section 4 and summarised in Appendix 2. The revised BIA does meet the relevant LBC's policy criteria, subject to a BCP to confirm: the ground conditions through additional investigation; the grouting methodology and design; sufficient structural monitoring

Appendix 1: Resident's Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Ground movement and damage impact assessment	Closed	December 2017
2	Stability	Construction methodology, temporary and permanent works information, retaining wall calculations, foundations assessment	Closed – recommended that site investigation sufficient to confirm ground conditions is subject to a BCP.	December 2017
3	Stability	Use of resin grouting	N/A – Subject to a BCP to demonstrate works can be controlled so that impacts are maintained within LBC Policy requirements (and to the satisfaction of neighbouring asset owners).	
4	Stability	Structural monitoring	Closed – recommended that the final strategy / monitoring locations / methodology are subject to a BCP.	December 2017

Appendix 3: Supplementary Supporting Documents

- Indicative Propping Arrangement by Sinclair Johnston and Partners Limited
- Indicative Construction Sequence by Sinclair Johnston and Partners Limited
- Email to CampbellReith from Sinclair Johnston and Partners Limited dated 1st December 2017
- Letter to CampbellReith from Sinclair Johnston and Partners Limited dated 23rd November 2017

SINCLAIR JOHNSTON
& PARTNERS LIMITED

Date DEC'17	Job No.	Sheet No.
Eng. GS		
Review	8781	
Project: S1-S2 TOTTENHAM COURT ROAD		

INDICATIVE PROPPING SEQUENCE FOR UNDERPINS

(1) EXCAVATE DOWN TO FORMATION LEVEL. PROPS TO BE INSTALLED SEQUENTIALLY AS UNDERPIN DEEPENS.

PROPPING IS REQUIRED ON ALL FOUR SIDES OF EXCAVATION

MAXIMUM WIDTH OF EXCAVATION = 900mm UNDER PARTY WALL

(2) INSTALL SACRIFICIAL VERTICAL TIMBER SHUTTERING FOR FRONT FACE OF UNDERPIN AND RELEVANT PROPS

(3) POUR CONCRETE

(4) ONCE CURED, INSTALL HYDROPHILLIC WATER BAR AND CAST 2ND STAGE UNDERPIN

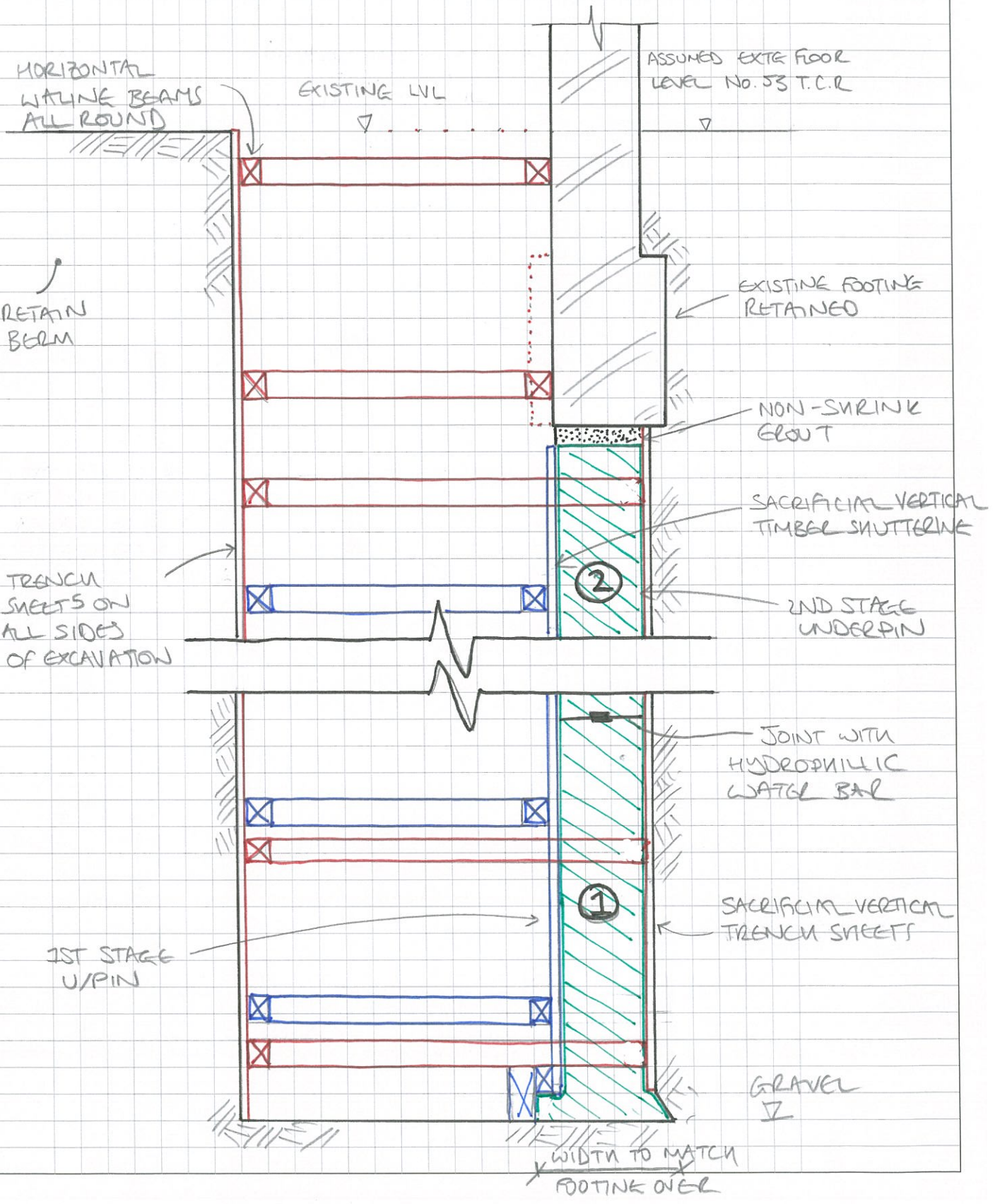
(5) ONCE CURED. PACK GAP BETWEEN UNDERPINS AND MASONRY WALL OVER WITH NON-SHRINK GROUT

(6) REINSTATE ARISINGS AND MOVE TO NEXT U/PIN IN SEQUENCE

SINCLAIR JOHNSTON
& PARTNERS LIMITED

Date DEC '17	Job No.	Sheet No.
Eng. GS	8781	
Review		
Project: 51-52 TOTTENHAM COURT ROAD		

INDICATIVE PROPPING DIAGRAM FOR UNDERPINS (PARTY WALL NO. 53)



SJ 2010

INDICATIVE CONSTRUCTION SEQ (PILES INSTALLED PREVIOUSLY)

1. UNDERPIN PARTY WALL TO GRAVEL (APPROX 6m)
   - TWO STAGE U/PIN TO BE INSTALLED CONCURRENTLY WITHIN SAME EXCAVATION.
   USE NON-SHRINK GROUT BETWEEN PINS

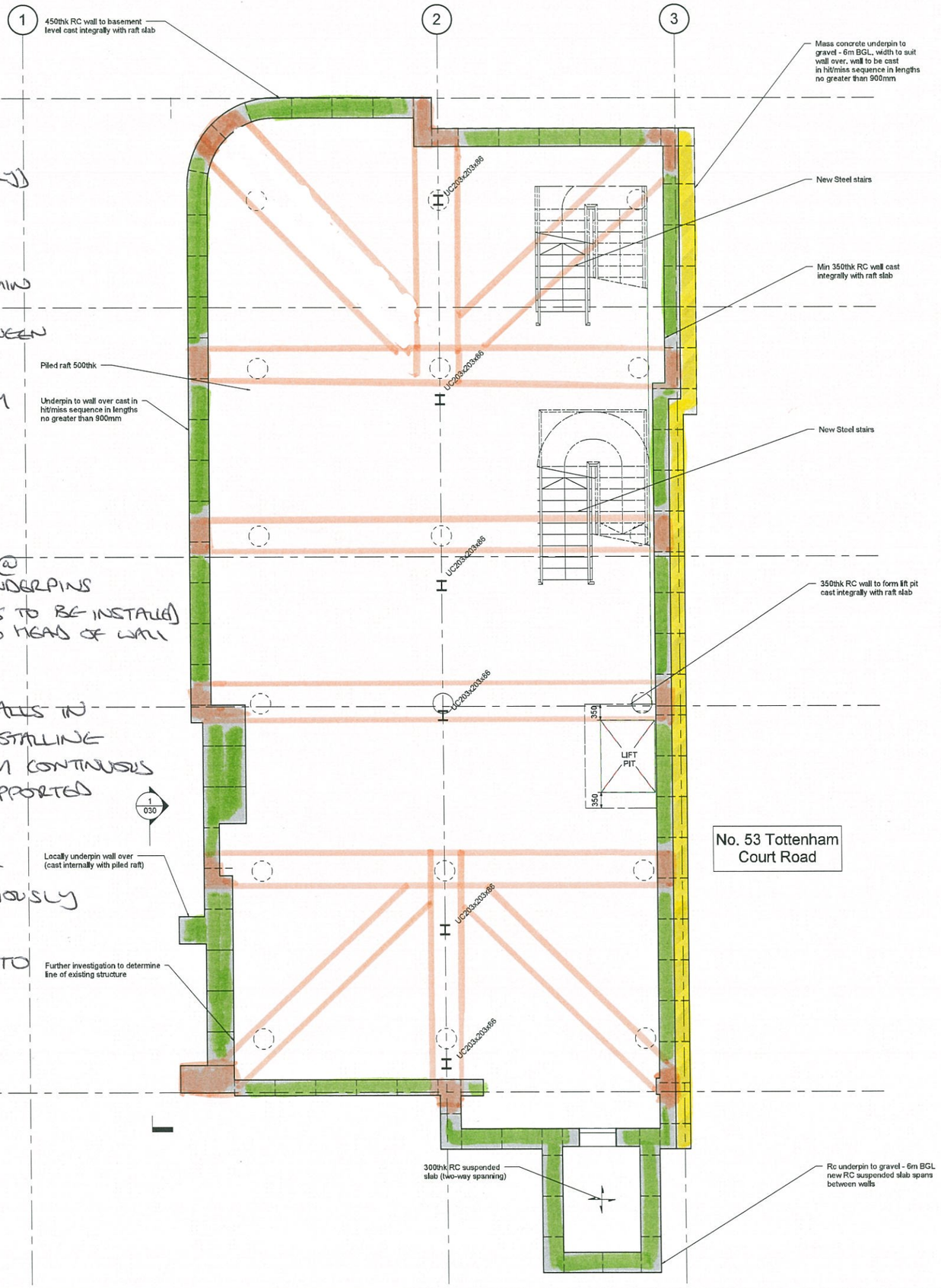
2. CAST UNDERPINS AND BEAM STRIPS AS SHOWN. MAX WIDTH = 900mm. TRENCH SHEETING AND PROPPING USED TO STABALISE SIDES OF EXCAVATION

3. INSTALL PLYWOOD BEAMS @ HIGH LEVEL BETWEEN UNDERPINS (REINFORCING KWIKA STRIPS TO BE INSTALLED) USED TO PROVIDE PROP TO HEAD OF WALL IN PERMANENT CASE

4. CAST REMAINING RC. WALLS IN UNDERPIN SEQUENCE (INSTALLING COUPLERS @ BASE TO FORM CONTINUOUS BEAM BETWEEN PINS SUPPORTED ON PILES

5. EXCAVATE DOWN AND PROP AS PER METHODOLOGY IN PREVIOUSLY ISSUED REPORT

6. CAST RAFT, TYING INTO BEAMS AND PILES



B1 - Basement Proposed

1 : 50

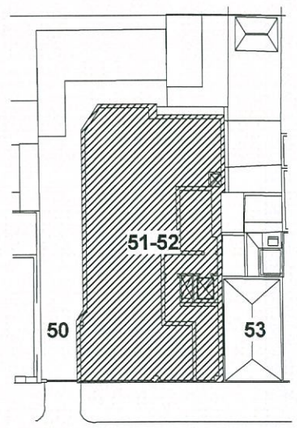
NOTES:

1. ALL STRUCTURAL ENGINEERING DRAWINGS ARE TO BE READ WITH THE SPECIFICATION AND WITH ALL RELEVANT ARCHITECTS AND SERVICE ENGINEER'S DRAWINGS AND SPECIFICATIONS
2. DO NOT SCALE FROM THIS DRAWING IN EITHER PAPER OR DIGITAL FORM. USE WRITTEN DIMENSIONS ONLY. TO CHECK DRAWING HAS BEEN PRINTED TO INTENDED SCALE THIS BAR SHOULD BE 50mm LONG @ A1 OR 25mm LONG @ A3.
3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES.

KEY

Mass Concrete Underpin

RC Underpin



Key Plan

THIS DRAWING IS NOT FOR CONSTRUCTION

Rev	Date	Issued	Amendment
-	06.04.17	CS	For Planning

Status: For Planning

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51-52 Tottenham Court Road

Basement Plan Proposed

Drawn	Author	Scale	As indicated @ A1
		Project No./Drawing No.	Rev
		8781/ 009	-

RE: 51-52 Tottenham Court Road, London, W1T 2EHGemma Sheard to: GrahamKite@campbellreith.com 01/12/2017 17:14
Cc: "KostasZapaniotis@campbellreith.com", "Ravi Azad", "Lester, Robert"
From: "Gemma Sheard" <GSheard@SinclairJohnston.co.uk>
To: "GrahamKite@campbellreith.com" <GrahamKite@campbellreith.com>
Cc: "KostasZapaniotis@campbellreith.com" <KostasZapaniotis@campbellreith.com>, "Ravi Azad" <RAzad@SinclairJohnston.co.uk>, "Lester, Robert" <Robert.Lester@camden.gov.uk>

2 Attachments

8781_171201_Indicative Propping Arrangement.pdf 8781_171124_Indicative Construction Sequence.pdf

Dear Graham,

Please find attached our indicative propping arrangement for installation of the mass concrete underpins beneath the Party Wall to No. 53 T.C.R. A similar arrangement can be adopted for casting the r.c. pins that will become integral with the piled raft.

Note that for all underpins shown in green on the previously issued mark-up (re-attached for information), packing between the r.c. and masonry wall over will not be installed until a continuous beam has been formed between pins to transfer loads down to the piles. As noted, in the temporary case a Pynford beam will be installed spanning between the underpins in Pink, supporting structure over.

Please do not hesitate to contact me if you have any further queries.

Kind regards,

Gemma

Gemma Sheard MEng
Project Engineer
Sinclair Johnston & Partners
93 Great Suffolk Street
London SE1 0BX
d: 020 7593 1916 e: GSheard@SinclairJohnston.co.uk

From: GrahamKite@campbellreith.com [mailto:GrahamKite@campbellreith.com]
Sent: 28 November 2017 13:00
To: Gemma Sheard <GSheard@SinclairJohnston.co.uk>
Cc: KostasZapaniotis@campbellreith.com; Ravi Azad <RAzad@SinclairJohnston.co.uk>; Lester, Robert <Robert.Lester@camden.gov.uk>
Subject: RE: 51-52 Tottenham Court Road, London, W1T 2EH

Hi Gemma

Thank you for the revised information and discussion this morning. With regards the construction sequence, could you also add a couple of section sketches please so we can understand the proposed propping arrangements?

As discussed, we're reviewing your sequence with the the GMA and will discuss any ground movement queries directly with GEA.

I will get back to you shortly if we have further queries.

Regards

Graham Kite

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8781/L/GS
23rd November 2017

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

To whom it may concern,

Re: 51-52 Tottenham Court Road, London, W1T (Basement Impact Assessment Audit; Project Number: 12336-87 Revision D3)

Many thanks for your report dated November 2017 'Basement Impact Assessment Audit' with regards to the works proposed at the above.

With reference to the comments raised in the report, please be advised that:

1. Ground movement and damage impact assessment.
   1.1. The report identifies that the ground movement assessment makes assumptions on underpinning within stiff London Clay, whereas the actual conditions are indicated to be loose Made Ground. GEA have provided clarification of the assumptions:

   'Where our ground movement assessment models shallower underpins as bearing within the made ground, these will in practice be tied into the basement raft foundation, which has been modelled as a uniformly distributed load.

   For the majority, our ground movement assessment analyses the proposed basement development as underpinned down to the competent underlying gravel. At no stage has the assessment assumed the deeper underpins will bear within the underlying made ground. Where the proposed walls will bear within the dense gravels, the horizontal movements of nearby sensitive structures have been estimated by using the profile of a stiff wall embedded within stiff clay, which is considered to be a comparable magnitude of movement to that of dense gravels. The vertical movement has been assessed in PDisp, which takes account of the presence of the made ground. In general, the assessment is limited to the data that is available which is limited for granular material and, in particular for made ground, such that the movement profile of clay must be used.'

   1.2. The report states that the movements predicted in the revised (November 2017) GMA are not considered to make reasonably conservative assumptions for two stages of underpinning (considering shrinkage of the dry pack) nor the settlement likely to be induced by the stage one underpins bearing within loose Made Ground. Please be aware that the two-stages will be installed concurrently within the same excavation. At no point

will loads by transferred on to the Made Ground. Non-shrink grout will be used in lieu of dry pack to prevent movement due to shrinkage.

2. Construction methodology, temporary and permanent works information, retaining wall calculations, foundations assessment.
   2.1. As noted previously, our construction methodology is consistent within the revised documentation.
   2.2. It has not been possible to confirm the depth of the foundation to the neighbouring building due to access restrictions. This will be verified on site prior to works commencing.

3. Use of resin grouting.
   3.1. The proposed use of resin grouting to control groundwater will be subject to a Basement Construction Plan (BCP).

4. Structural monitoring.
   4.1. As noted previously, the Ground Movement Analysis has predicted that the proposed construction may result in the building damage for sensitive structures of Category 1 (Very Slight). The movement monitoring specification ensures Category 1 (Very Slight) is maintained.
   4.2. The final movement monitoring strategy to be adopted by the Contractor will include for monitoring to relevant structural walls within the zone of influence; monitoring points to be positioned to ensure that they are located away from the zone of influence; and frequency of monitoring shall be altered to suit the programme of works as noted within the Audit report.

The Basement Impact Assessment and our responses to the Audit queries within this letter have demonstrated that the proposed scheme will maintain the structural stability of the building and neighbouring properties; resulting in movements up to Category 1 (Very Slight) as required by London Borough of Camden.

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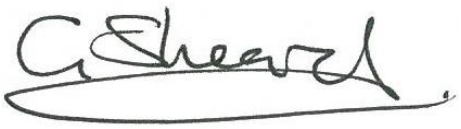
SINCLAIRJOHNSTON

Should you require anything further or wish to discuss anything in greater detail, please do not hesitate to get in touch.

Yours faithfully
FOR SINCLAIR JOHNSTON & PARTNERS LIMITED



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